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THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH was organized in Boston, March, 1890, *with the following objects: the advancement of sanitary science; the promotion of better organization and co-operation among local boards of health, and the uniform enforcement of sanitary laws and regulations.*

All communications concerning the ASSOCIATION should be addressed to the Secretary of the Association, JAMES C. COFFEY, CITY HALL, WORCESTER, MASS.

All bills not relating to the Journal, and MEMBERSHIP DUES $2.00 *per year), should be sent to the Treasurer of the Association, DR. JAMES B. FIELD,* 329 *WESTFORD ST., LOWELL, MASS.*

THE JOURNAL OF THIS ASSOCIATION has for fourteen years faithfully reflected the views of the public hygienists of Massachusetts. With the October issue of the year 1903, *a policy of expansion was adopted, and the encouragement received from a great many hygienic quarters led to still further expansion, as may be seen in this issue.*

The dates of publication are FEBRUARY, MAY, AUGUST *and* NOVEMBER *of each year.*

THE JOURNAL will contain the papers read at the meetings of the Association, papers contributed by hygienists, reports of the discussions, editorials, abstracts, reviews and hygienic notes of professional interest. Subscription rates, $1.00 *per year. Reprints furnished at cost price.*

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EDITORIALS.

SCARLET FEVER ISOLATION.

The length of time that a patient ill with scarlet fever should be isolated is a very important matter, and has been the subject of careful study by those who have the charge of infectious diseases. The practice in different localities varies very considerably; as for instance, in Glasgow the time is much longer than in England and in this country. The so-called return cases are a source of annoyance to the physician and an injury to the public. Some physicians go so far as to say that the desquamation is not infectious, but that the contagium of scarlet fever is in the discharges from the mucous membranes and from the ears. This is a little too radical an opinion and is not in accordance with clinical experience. There is no doubt that during the active stage of primary desquamation scarlet fever is infectious. There is very grave doubt if the secondary desquamation is infectious. In scarlet fever, bacteriology is of no assistance because, as yet, the organism that causes the disease has not been definitely discovered. Mallory's work in this direction is of very great value from a scientific point of view, and while he has proved that a protozoön is the cause of the disease, the length of time required to find the organism deprives Mallory's discovery of much practical benefit. The other organisms found in scarlet fever have never been definitely shown to be the cause of the disease. It must be taken as an accepted fact that scarlet fever is infectious from the commencement of the attack, even before there is an eruption. It has also been proved that the disease is not so infectious at this stage as later in the course of the attack. There is also abundant clinical experience proving that scarlet fever without an eruption, with marked throat symptoms, is infectious. In many of the so-called return cases, investigation has shown that some member of the family had a sore throat, presumably scarlatinal in its nature, which was the cause of the outbreak of the disease and not the patient who was discharged from the hospital.

In 1898 the Metropolitan Asylums Board of London commenced a series of investigations on this point. The investigation was made by Dr. W. J. R. Simpson and was very carefully conducted for a period of six months. His report was referred to a committee of the Royal College of Physicians, England. The conclusions reached briefly were as follows:

1. "The committee have carefully considered Dr. Simpson's report and the documents referring thereto, for the purpose of expressing an opinion as to whether, and if so, under what conditions, the present period of detention of patients in the hospitals of the Metropolitan Asylums Board could consistently with public safety be shortened."

2. "The committee are impressed with the small percentage of those cases which, on investigation, were found to have given rise to fresh infection, viz., 1.1 per cent on the total cases discharged from hospital of diphtheria and scarlet fever taken together. They also note that of these, no fewer than 80 per cent were suffering from some mucous discharge, either during their stay in hospital or shortly subsequent to their return home."

3. "The total number of return cases of diphtheria was 21, equal to a percentage of .5 on the cases of diphtheria discharged. With reference to the length of detention after diphtheria, the committee are of opinion that this can only be left to the discretion of the several medical superintendents. The importance of the question of return cases mainly turns on the length of detention of scarlet-fever cases, which are more numerous than those of diphtheria. The proportion of the return cases in diphtheria is small, viz., .5 per cent of the patients discharged after suffering from that disease; and apart from the difficulty which is occasionally experienced in respect to the recognition of the specific bacillus, a difference of opinion exists as to the practicability of regulating a patient's detention by bacteriological examination alone."

4. "The total number of return cases of scarlet fever was 90, giving a percentage of 1.3 of the total number discharged. In endeavoring to arrive at a definite conclusion as to the necessary length of detention in scarlet fever, there are two points on which elucidation is required.

The degree of infectivity attaching to—

(*a*) The desquamation of the skin.

(*b*) Any mucous discharge occurring during convalescence."

"In respect of the infectivity of the later desquamation of the skin in scarlet fever, it is to be observed in Dr. Simpson's investigation that in only 2.7 per cent was there any reason to suspect desquamation of the skin as the cause of secondary infection. The relatively high degree of infectivity of the mucous discharges, as compared with the later desquamation of the skin in scarlet fever, as shown in the report, is one which is obtaining an increasing support among those of the profession who have had much to do with infectious diseases. It would suggest that possibly too much importance has been hitherto attached to the infectivity of the skin during the later weeks of scarlatinal convalescence. The committee have communicated with the authorities of many hospitals in other large cities in this country, in America, and in Germany, and have ascertained that the period of detention insisted on is of somewhat shorter duration than is practiced in those of the Metropolitan Asylums Board. Unfortunately no corresponding record of the incidents of return cases is available for comparison with that recently obtained for the Metropolitan Asylums Board."

In the *London Lancet* of March 12, 1904, is an extremely interesting paper by R. E. Lauder, F.R.C.S. Edinburgh, D.P.H. Medical Officer of Health of the County Borough and Port of Southampton; Medical Superintendent of the Borough and Port Fever Hospital.

Dr. Lauder takes a very decided stand regarding the infectivity of discharges from the mucous membranes and does not place so much stress upon the contagiousness of the desquamation. Dr. Lauder says that in 1902 no cases of scarlet fever were discharged from the hospital until all peeling had ceased, but that during 1903 he has acted on the belief that the infection is in the respiratory tract, that the constitutional condition, and particularly the rash, are only the result of toxic products, and that therefore the desquamation of the skin is not *per se* a source of danger.

He gives the following tables:

TABLE I.

Year	Cases Notified.	Removed to Hospital.	Discharged from Hosp'l.	Av. Period in Hospital.	No. Causing "Return" Cases	Cases Treated at Home.
1902	261	208	164	48 days	7	53
1903	427	353	325	34 "	7	74

TABLE II.

	Discharged.	Av. Duration in Hospital.	No. Causing "Return" Cases
1. Without peeling or complications .	33	33	0
2. Peeling without complications . .	204	28	2
3. Cases with compl.cations	88	50	5
Total	325	34	7

A glance at Table 1 shows that in 1902 the average period of detention in the hospital was 48 days, while in 1903 it was 34 days. In 1902 there were 208 patients admitted to the hospital and there were 7 instances of return cases, while in 1903 there were 353 cases admitted and 7 instances of return cases. In Table II he gives the number discharged without peeling or complications; the number peeling without complications, and the cases with complications. It is interesting to note that there were no return cases where there was no peeling nor complications; that where there was peeling without complications there were two instances of return cases; that where there were cases with complications there were five instances of return cases. This paper of Dr. Lauder's is an extremely valuable one, but from the comparatively small number of cases it seems as if it would be hardly safe to accept his deductions.

In other words, in view of the immense amount of clinical experience proving the infectivity of desquamation, it would harldy be a wise procedure to discharge patients from isolation as long as there was any peeling. This question, however, is one that should receive more attention from boards of health.

At the South Department of the Boston City Hospital the average length of time that a patient remains in the hospital is 50 days. No patient is discharged who has any discharge from the nose or any abnormal condition of the throat.

In 1903, 650 patients were discharged from the scarlet fever ward. There were 15 instances of alleged return cases. Investigation, however, failed to show anything abnormal in the condition of the individuals discharged. There was a certain number of

alleged return cases where it was demonstrated that the source of infection was not the patient who had been discharged from the hospital, but from patients who were suffering from mild and unrecognized attacks of the disease. In order to prevent the possibility of return cases, the following circular is given to each patient on his discharge from the hospital:

THE BOSTON CITY HOSPITAL,
SOUTH DEPARTMENT,
745 Massachusetts Avenue,
BOSTON, December 16, 1902.

Advice to the Parents of Patients who are Discharged from the Wards Set Apart for Infectious Diseases:

1. To avoid any possible danger of the communication of scarlet fever, measles or diphtheria to other members of the family, it is much safer for any person who has just been discharged from the wards used for these diseases to sleep alone for *at least one week*, and preferably for *two weeks*.

2. These diseases are especially likely to be spread by means of discharges from the ears or nose, or from any running sore on the body, long after the patient is otherwise entirely well. Therefore, if at any time during two weeks after discharge from the hospital the patient shows any such trouble, he should immediately be brought back to the hospital for examination, and in the meantime should keep as much as possible away from others, and should not use the same towel, brush, comb or other toilet article that others use. When there is any such discharge, handkerchiefs, etc., that are used should be burned when it is possible; when this is not possible, they should be thoroughly boiled. It is better that separate toilet articles be used even if there is no apparent trouble.

3. When a person comes home from an infectious ward, clothing, toys, books, etc., used by him at the time he was taken sick should not be brought out again unless it is certain that they were *thoroughly* disinfected.

This advice is especially important in cases of scarlet fever.

In very many instances the alleged return cases of scarlet fever have no connection with the discharged patient, as the following

quotation from the Report of the Metropolitan Asylums Board proves:

1. "Lily T. returned home from hospital where she had been treated for scarlet fever for 45 days. Later, Ida and Dudley T. were reported as suffering from scarlet fever. On investigation it was ascertained that Elsie, a cousin living in the same house, had been attacked with scarlet fever *one day before* Lily returned, and that the probable cause of Elsie's attack was infection from a mild case that had been kept at home and not sent to hospital."

2. "Harry G. returned convalescent from hospital after 51 days' detention in hospital for scarlet fever. A few days afterwards Winifred W. and Clara G., living in the same house, were reported suffering from scarlet fever. On inquiry it was found that Winifred W. had been removed to hospital for scarlet fever *about half an hour before Harry arrived home.*"

3. "Alfred G. was treated in hospital for diphtheria, and was detained there 63 days; 17 days after his return home, Lily G. was attacked with scarlet fever. The possible source of Lily's infection was from cases which occurred amongst children on the opposite side of the street."

4. "Theodore W. was attacked with scarlet fever 16 days after the return of his sister from hospital, where she had been detained 76 days. On her return she remained in excellent health. For the first week she slept with two of her sisters, aged 17 and 7 respectively. The sister aged 7 was the delicate one of the family. Neither of these were attacked. Later Grace slept with Theodore. On the twelfth day after her return, a dressed doll which Grace played with while in bed, and which was put away when she was taken to hospital, was brought out and played with by Grace and Theodore. Grace washed the flannel clothes of the doll, and Theodore washed his face and mouth with the flannel clothes. Two days after this Theodore began to complain, and on the fourth day the rash of scarlet fever appeared on him."

5. "Thomas P. and William L., members of different families, were attacked with scarlet fever 14 days after the return of Amy C., who belonged to a third family living in the same house. Amy C.'s

three brothers and sisters, with whom she came much in contact, remained quite well. Eleven days' after Amy's return, Thomas P. and William L. were permitted to go downstairs and play with her, and, to amuse them, Amy's books and satchel, which she used when ill in bed, before she was taken to the hospital, were brought out from a cupboard in which they had been lying since her removal to hospital. Three days after both children were attacked with scarlet fever."

Many instances of a similar nature occurring in Boston during the past few years might be cited.

After a careful consideration of Dr. Lauder's paper, after a study of the report of infectious hospitals, both in this country and abroad, it seems evident:

First: That in scarlet fever discharges from mucous membranes are infectious.

Second: That desquamation is also infectious.

As a corollary to the foregoing conclusions, it may be said that no patient should be removed from isolation as long as there is any discharge from the mucous surfaces, or as long as there is any primary desquamation.

There can be no definite time limit, but the average time in the majority of cases of scarlet fever, from the commencement of the initial fever until the process of desquamation is completed, is about 50 days. In certain rare instances, particularly in very young children, the time may be somewhat less.

COPPER SULPHATE vs. ALGAE.

For the past few weeks the professional and lay press has contained many references to the Department of Agriculture bulletin on this subject,* and many unauthorized claims of excellence have been made for the results reported by the authors.

The bad odors and tastes produced in water by growths of algæ have long been recognized. Sometimes they are so persistent and extensive for short periods, that the most elaborate systems of aëration combined with double filtration, fail to remove the odor completely.

As the result of a series of brilliant studies, the authors have devised a method which consists in adding minute yet alga-toxic quantities of copper sulphate to the water under consideration, with the result that the odor-producing algæ are quickly killed. In practice only .25 parts of copper sulphate per million are required to kill such organisms as anabaena and uroglena. Drs. Moore and Kellerman give evidence of the harmlessness to man of these minute quantities of copper, such as would be applied to water contained in reservoirs. The method has been under observation for over a year, and undoubtedly will prove a valuable tool in the hands of sanitary experts and engineers.

The first reservoir treated was one under the observation of the present writer, at Winchester, Ky. At one time during July, 1903, this reservoir contained nearly 9,000 organisms, and the water was offensively putrescent because of the presence of anabaena. On July 9 of the same year the reservoir was treated with .25 parts of copper sulphate per million, the salt being applied from a sack which hung over the stern of a rowboat, which latter was made to traverse practically the whole surface of the reservoir. The results were as follows:

Date.	Volumes per c.c.
July 6	3,400
" 9	(Day of treatment.)
" 10	54
" 11	8
" 13	0
" 15	0
" 20	0

It was thought by some sanitary experts that the cold, wet season of 1903, rather than the treatment, was responsible, in part, for the disappearance of the organisms, but in July, 1904, the reservoir was still free from anabaena, and a second treatment of .12 parts of copper sulphate per million resulted in the disappearance of nearly all the grass-green algæ as well. There was left in the water only harmless crustace and a few pediastra. Jamaica Pond, Boston, which at this time of the year usually contains about 1,500 organisms per c.c., was also treated with copper in 1903. This summer the organisms number less than 100 per c.c.

At Elmira, Caird† reports a successful trial of this method, but as he used about five times the ratio of copper sulphate used at Winchester, a few fish were killed. At present Dr. Moore advises a greater dilution (1.3 parts per million) than that used at Elmira. The cost of treatment at Elmira was less than 75 cents per million gallons.

Many other reservoirs have been treated this year, among them the reservoirs at Cambridge, N.Y., Butte, Mont., and Belchertown, Mass., with success in each case, it is believed.

The authors also studied the effect of copper sulphate upon mosquito larvæ and pathogenic intestinal bacteria. They state that 10 parts of copper sulphate per million suffice to kill *B. typhosus* and *Microspira comma* (the cholera bacillus), at room temperature, in less than 5 hours. Furthermore, mosquito larvæ are readily killed by this reagent.

The authors state that the method is not one for a novice to apply, as the nature of the organism must be known before treatment can be prescribed. Each reservoir must be treated specially, and the authors believe that the advantage to the public health promised, warrants this special treatment. The cost for treating a reservoir semi-annually would not be a serious factor.

The treatment is not designed to replace efficient means of filtration, since it hardly affects the turbidity of the water, but is to be an aid where such treatment alone does not suffice. It probably would be of special value during typhoid epidemics.

It is specially stated in the bulletin that "it would be a matter of regret if the method proposed here should ever be regarded as a universal panacea to be used by every one, regardless of the organism to be eradicated and the condition of the water."

It has been suggested to the authors that the therapeutic value of copper sulphate for the treatment of typhoid fever should be carefully investigated.

* G. T. Moore and K. F. Kellerman. Bulletin No. 64, Bureau of Plant Industry, U. S. Dept. of Agriculture.

†Eng. News, 1904, LII, 34.

A PARADOX IN THE DEATH-RATE IN VARIOUS DISTRICTS IN NEW YORK.

Under the foregoing title, *American Medicine*, June 4, 1904, publishes an item showing marked disparity in the death-rates of certain wards in the city of New York (the seventh, tenth, eighteenth and twentieth). In these selected wards it appears that the death-rate was lower in those which are most densely settled (the seventh and tenth) than it was in the less densely settled eighteenth and twentieth wards.

The explanation of this apparent paradox is undoubtedly to be found in the fact that sanitary conditions, such as overcrowding, uncleanliness, etc., are by no means the only conditions which influence the death-rate. The *age distribution* must always be borne in mind in considering this question. The effect of immigration also is apparent, since it introduces a large number of healthy persons at ages when the death-rate is low. For example, a colony of male Italians, living in a certain ward and laboring upon public works, should have a low death-rate (not over 6 or 8 per 1,000), and this fact influences the death-rate of the whole ward. Many of these laborers are unmarried and have no children. Consequently the death-rate is also low.

The presence of large hospitals and other public institutions also raises the death-rate. Ward 18, in New York has three of the largest hospitals.

A method of comparing the death-rate of different communities in which the age distribution differs, may be found in the report of the State Board of Health of Massachusetts for 1902 (34th Annual Report), in which the death-rates of 20 cities are corrected upon this plan.

The only definite figures quoted in this item, upon which one may found an opinion, are those of the seventh and twentieth wards, each having a population of about 90,000, but one having 1,300 deaths in a year, and a consequent death-rate of 14.4 per 1,000, and the other having 2,000 deaths, and a death-rate of 22.2. These two wards both show a wonderful improvement since the publication of Dr. Billings' excellent maps and tables of New York

City in the U. S. Census Report of 1890. In this report the death-rates of the seventh ward was very heavy, 33.7 per 1,000, and that of the twentieth was 33.5. The lowest rate in any district of these two wards was 27.9 per 1,000 in one district of the seventh.

As an instance of the marked effect of age distribution, there are two adjoining towns in Massachusetts, of nearly equal size, one of which had a death-rate in 1902 of 13.3 per 1,000, and the other, 122.2 per 1,000, or nearly ten times as great, the latter being due to the presence of a large public institution in which there are collected large numbers of old people, and also many infants born in the institution. The death-rate of each of these classes being very much above the general death-rate.

JULY QUARTERLY MEETING

OF THE

Massachusetts Association of Boards of Health.

The quarterly meeting of the Association was held on Thursday, July 28, 1904. In the morning, at the invitation of the State Board of Health, members inspected the new laboratories for the manufacture of diphtheria antitoxin and vaccine lymph at the Bussey Institute. Shortly after noon the steamers "Vigilant" and "John H. Howard" took them to Gallup's Island, Boston Harbor, where, by the courtesy of the City of Boston, dinner was served.

After dinner a business meeting was held under the chairmanship of Dr. H. P. Walcott. The reading of the records of the previous meeting was dispensed with, and the following members were elected:

F. J. Hanley, M.D., Whitman; J. E. Richardson, Somerville; William Craig, Brookline; William P. Gesner, Boston; A. E. Mossman, M.D., Westminster; Luke H. Howard, Taunton; James O. Jordan, Boston; Edwin P. Gleason, M.D., Brockton; N. C. B. Haviland, M.D., Holliston; William R. Morrow, M.D., Framingham; C. P. Holden, M.D., Melrose; E. L. Grundy, Melrose; G. Houston Smith, Melrose; F. E. Stone, M.D., Lynn.

THE PRESIDENT. The first paper, the only one upon the program, is a paper upon the "Etiology of Leprosy." I am requested to say that after a discussion of this subject by certain gentlemen who are familiar with cases of this disease, Dr. Carson will exhibit a specimen, an individual afflicted with leprosy, to the Association. I now have the pleasure of introducing to you Dr. Smith.

PROFESSOR SMITH. Mr. President and Gentlemen of the Association: Certain reasons have made it desirable that I should look over the recent literature of leprosy in order to see whether our knowledge concerning its transmissibility had in any way changed in recent years. There is no special reason why I should stand here to-day and read a paper on leprosy, because I know very little about it. I only saw one case in my life. That was ten years ago, in Berlin. There are those among you who have seen more. But the paper which I shall read may be considered a kind of summary of our existing knowledge, which will be a very good introduction to a general discussion on your part, and I trust that you will take the paper in that light.

[EDITOR'S NOTE.— Owing to the very regrettable loss of the manuscript of this paper, and the absence of a duplicate, the publication has been delayed. Dr. Smith has kindly promised to rewrite the article, if possible, for our next issue.]

THE PRESIDENT. It is always a pleasure upon these occasions to call attention to the great obligations that the state of Massachusetts is under to the city of Boston for the protection which the city of Boston gives to the public health of this commonwealth. In the matter of leprosy, of course the most of our leprous patients have been in the control of the city of Boston, and concerning the policy of the city of Boston in such cases, I think we should all be glad to hear from Dr. Durgin, who fortunately has had control of them for a great many years.

DR. DURGIN. Mr. President and Gentlemen: There are but few words I may say with regard to leprosy as having been cared for in the City of Boston. Within the last thirty odd years I have known but four cases personally, and only that number has come under the notice and care of the Boston Board of Health. One of these was found in East Boston, living as any other member of a family. He had lived in Honolulu, where he evidently took the

disease, and had been suffering from it for some years, was in quite an advanced stage, even to the necrosis of his toes and fingers. There were suppurative ulcerations going on, so that he had to be bandaged to protect the family and to prevent the oozing of the matter upon furniture and other things about the house. It was an astonishing thing to me in those days to find one of these cases so ill-cared for, to appearances, as this, in the midst of a family, that is, in his own family. He was taken at once to the island here and kept, and while his appearance indicated that he might live only for a few months, he lived about three years and a half. How much was due to good nourishment and good care I cannot say, but I have learned since, that such patients live on far beyond any ordinary prognosis that you would be likely to give. The protective measures against the spread of the disease are easier applied here than they could be in a less isolated place.

Another case which came was found, so far as the Board of Health is concerned, in a large charitable institution in Boston. I don't think it will hurt the institution any for me to say here what is was. It was the Massachusetts Charitable Eye and Ear Infirmary, where he went to have his eyes treated, they being somewhat affected in this case. We took him here, and under the extraordinary treatment by Dr. Carson, he cleaned up so well that he ran away, thinking himself well. And he certainly was strong. He pulled himself away in a stone boat. We found him and took him back. When he was still further recovered, so that he looked smooth and free from anything of this sort of disease, he ran away again, and we were not very sorry, because he was in good shape and perhaps free from the disease.

Another case, which we found ashore, is present to-day, and will be shown you. His environment and much that may be said can better be said to you by Dr. Shea, who had the oversight of the case. In fact, Dr. Shea has seen and looked after the others to a considerable extent.

One case, in which Dr. Shea is still more interested, was the one which I want to mention as the only one which we have ever taken from a vessel in the harbor. She came from Sweden, and was in very bad shape, passed two English physicians at Liverpool, but

was very quickly detected by Dr. Shea as quarantine physician here at that time. Photographs were taken, and she was held here at the island for some months and then returned to Sweden.

The policy of the Board has been to take these patients as early as convenient and isolate them. Their treatment until within the last year or two has been simply the supporting treatment, and good, nourishing and clean care. In ulcerative cases we have found it right to cover them with mosquito netting to keep the flies away, keep them out of doors on the piazza as much as possible in suitable weather, and cover them in their chairs with netting. The treatment as given by Dr. Carson may be interesting to you, and also the environment and the method of picking them up by Dr. Shea.

DR. SHEA. Mr. President and Gentlemen: As Dr. Durgin has told you, in the last fifteen or twenty years I have had charge, for the Department, of five cases of leprosy. The very important thing for this Association, and especially for Boston, to determine is what we ought to do with these lepers. Look at the financial end of the question. It is very serious, financially, to have to take a patient and maintain him for three, four or five years. It means a great expense to the city. And as far as I can learn from my observation in the last fifteen or twenty years, especially the study of these cases, I have yet to find that any of them did any particular harm.

The first case that Dr. Durgin mentioned to you was that of the Swedish woman. Her family was living in one of the towns adjacent to Boston for a great many years, and I personally had an observation kept over the children for ten years after she was sent back to Sweden. She had a very large family, eight or ten children, and at the time they were discharged they were free from all signs of the disease. Again, in these other cases that we have picked up in Boston, it could never be said that the people were infected in this country. The infection, it has been fair to say, has been contracted elsewhere. Three cases were among seafaring men, who had at some time in their life been in Honolulu, where the disease is endemic.

We all know the policy adopted by the Board of Health of New York about five or six years ago. They began by taking a leper to North Brothers Island. Within a few years they had quite a colony there, I think about ten lepers, and the question of expense immediately had to be considered. These men seemed to thrive, and the outlook was that they would live there for years. The Board of Health of New York discharged these lepers, and within a few days they turned up at different charitable institutions. I don't know what the final result was, but I think that the Health Department of New York had to receive them again.

Probably the gentlemen might be interested, especially the medical men of the Association, with the differential diagnosis of this disease. Years ago there was always an element of chance in these cases, but thanks to bacteriology, leprosy is one of the most simple diseases now that a health official has to deal with. This last case that we have, that we are about to show you here, was under treatment by a physician in Boston connected with a hospital. He had given the patient a very thorough specific treatment, and was rather disappointed at not obtaining any results. He asked me to see the man, who was a Chinaman, and from his history I was rather suspicious of leprosy. At that time, I took one of the nodules and sent it down to Dr. Hill, and he gave me a diagnosis within twenty minutes. He found the lepra bacillus. Of course, for a differential diagnosis, we would have to consider syphilis and lupus. The bacteriologist can tell you whether you are dealing withlupus, or leprosy. The question of syphilis could be decided by thorough specific treatment for a time.

If a patient with leprosy could be placed under proper surroundings, for example, the surroundings of a modern hospital, I do not see how he could be any danger or menace to the immediate family or anybody in the community, if proper precautions are taken with the discharges, and in early cases I cannot see how there could be any danger. Where the case is well advanced, and the lesions are many, and the ulcerations have broken down, I think that probably as a matter of safety, if the patient cannot get the care that a modern hospital could afford him, it is time for the

health authorities to act and remove him. That has been the policy of this Health Department. Unfortunately, all our cases have been cases which have required hospital treatment and could not be isolated at home, and we have been obliged to take them, at a great expense, as I said before, to the city.

Whether or not the disease is communicable, a very interesting case happened while I was at the quarantine station, that throws some light upon the question. I boarded a vessel one morning, and the captain told me, as I was about to leave that I probably would, in a week or two, board another vessel that was coming from the same port, Dutch Guiana, and that there would probably be there as passengers two boys. Before he had left he had been asked to take these boys as passengers and had made arrangements, but had been told before he sailed that the father was a leper. Fearing that he might be held up in Boston and undergo a long quarantine, he refused the boys. Within a week or two, as he had foretold, the boys arrived. They were being sent to the states to school. One of them was about twelve, and I think the other was fourteen years of age. I examined them. As far as I could see, they were perfectly normal, healthy boys, with the exception of one, that I thought was inclined to be tuberculous. We held the boys that day—it was a Sunday, I remember very well—till I could communicate with the authorities and with the people with whom they were to board in the city. The Board determined that we could not hold them, as they were free from disease; but we did determine to keep them under observation, which we did, and within a year one of them came down with leprosy and was sent back home. The history, as I remember, that the boys gave me at that time was that their father had been sick for six years. They had lived on a very large estate there, and had not seen him; he had lived in a hut, or, rather, a more pretentious building, built for his exclusive use, and he had his own servants, and no connection at all with the immediate family. In all these cases we have to take what our experience brings to us to aid us in forming an opinion. Of couse, this case would be very strong evidence on the question of heredity, but still, on the other hand, there were these other cases, where it is only fair to suppose that the infection was

direct from visiting these countries, such as Honolulu, where there is more or less leprosy.

I think the question for the boards of health of this state to decide, and especially for Boston, is, Is it necessary to isolate these patients, especially such a case as that we are going to show you to-day,—a very early case? Probably three or four years from now, if this man doesn't improve under treatment, he would be a fit case for the Board of Health to take and maintain in a hospital; but in his present condition I am very strongly of the opinion that if he is so situated at home that he could have the facilities of a modern hospital and the care and treatment that a hospital would give, it would not only be a hardship, but I think it would be cruel to send him, as he has been sent, to this island to pass the remainder of his days.

Dr. H. W. Hill. The only thing that strikes me, not covered by previous speakers, is Dr. Shea's reference to my making a diagnosis in twenty minutes. It is true that bacilli can be quite readily found in many cases, and yield very fair evidence of the conditions, especially when taken with the clinical evidence. It is unlikely that tubercle bacilli would be found in tubercular lesions in such number and so arranged as to be confused with lepra bacilli; but to clinch the diagnosis and make it final, we have made a practice, in the few cases we have seen, of inoculating a guinea pig, so as to exclude possible tuberculosis entirely. There is no harm in being as safe as one can be, when one has all the facilities. Of course, the guinea pig is a very sensitive test for tuberculosis, but with leprosy it shows nothing whatever. In the course of four or five weeks—five better than four—the guinea pig is chloroformed and autopsied. If no lesions whatever are found, one can rule out tuberculosis, leaving the diagnosis leprosy. Various differences in staining between tubercle and lepra bacilli are described by the authorities, but the differences are hardly marked enough for us, with the necessarily limited experience which we have had, to base so important a diagnosis on them alone. One should keep in mind, also, the various forms of acid-fast bacilli, smegma bacilli, etc., as possible sources of error, but these are not likely to make trouble.

DR. CHAPIN (Providence). Mr. President, I am happy to say that we have only had one case in Rhode Island.

Two years ago Dr. Swarts called my attention to a patient whom he had in the Rhode Island Hospital, and on whom he had already made the diagnosis of leprosy, so that I was not troubled on that score. I think it was of the anæsthetic type. He had contracted the disease some eight years before, if I remember rightly, in Pernambuco, South America. He had been living in Providence nearly all the time since then. The bacilli were found in great profusion in the secretions from the nose. The problem of what to do with him fell to me, and for the next few hours I was a good deal disturbed in my mind. Perhaps my trouble was a little increased by the fact that he was a well-known business man and an acquaintance and neighbor of mine. The problem, however, was soon solved by his escape from the hospital. He went to some isolated place in Pennsylvania, near the boundary between New Jersey and New York, thinking that there he could be safe from officious health officers by going from one jurisdiction to another.

After the very clear and concise way in which Dr. Smith has presented the present status of the leprosy question, it seems to me that we must all be agreed that the only thing to do is to secure the isolation of these patients. The real problem, though, is how to bring it about, and certainly this is a very difficult problem for us. It seems to me that the best solution would be to have a national leper home for the isolation of these occasional cases that occur in this part of the country.

Take a case like the one that we had in Providence. I had made up my mind that if his family were willing to take the trouble, it would be perfectly simple and easy for them to isolate him in their home, but the event, as it turned out, showed how risky that would have been. This man is not isolated at all now. Where he is, I do not know, but I imagine in New York City. That appears to be a haven for lepers at present. They can go there and go freely about their business, and are not interfered with. They can easily conceal themselves in that city, and apparently the Board of Health of New York City does not care much about isolating them. Of course, with poor patients, it will be necessary,

as Dr. Shea said, for the town or city to take them in hand and maintain them in isolation, which is a very expensive and difficult matter. As we know, even in Boston, they sometimes escape, even when they are kept on an island. I have no sympathy with that view which would permit the lepers to go about. It seems to me we are running a very great risk indeed to do so.

I have heard it said that, because it is apparently difficult for leprosy to be transmitted from one person to another, it is unreasonable to be strict in the isolation, that we might just as well isolate every person with tuberculosis as to isolate every person with leprosy. I think that the comparison is an unfair one. We have no leprosy in the country at the present time, to speak of, and we should take every precaution that it should not become as common with us as tuberculosis is. If the United States were as free from tuberculosis to-day as it is from leprosy, certainly every case of tuberculosis that appeared on our shores should be, and I think would be, put into the strictest isolation, and we should in one way or another secure the isolation of all cases of leprosy.

Dr. Morse. Mr. President and Members of the Association: I cannot offer anything further except corroborative evidence of what has already been said.

Early in the spring, I think in the month of April, a leper was found in the town of Harwich, down on Cape Cod, and one of the local physicians made a correct diagnosis of the case. The man was one who had come from the Cape de Verde Islands about nine years ago, and from his family history it was ascertained that his mother and two sisters had died of leprosy before his sailing for this country. He landed at New Bedford, apparently free from the disease, and since that time he has lived successively in New Bedford, Fall River and Harwich. He has been free to go wherever he pleased, although during the last five or six years he has shown active symptoms and lesions of the disease at all times. He has been variously treated by different physicians for syphilis and for constitutional diseases, but with no apparent result. He has a large family. Although he has been in this country only

about ten years, he is the father of nine children, the youngest one about three months of age now, so that every facility has been given for the transmission of the disease to his own family. At the present time, neither his wife nor any of his nine children show any evidence of the disease, which again impresses us with the very slight infectious character of it.

The case is certainly not an advantageous advertisement for the town of Harwich, where many summer people go, and it was the intention of the town authorities to get rid of the patient at the earliest opportunity. They brought the question before the Attorney-General, but got very little relief. Finally, an act was passed by the Legislature in its closing days, giving the State Board of Charity authority to remove this patient, if they so desired, but up to the present time he has been allowed to remain in the careful hands of the selectmen of the town of Harwich. He has been separated from his family, and at present is in a house all by himself. The town sees that he has plenty to eat, and not being of the class of people who have very high ideals in life, he has no desire to escape. His one accomplishment seems to be music, and the town has very properly provided him with an accordion on which to play, and he takes great pleasure in doing that. He has worked in the cranberry bogs during the fall, and in the woods during the winter. Although he has resided in this country and in this state a number of years, he has never become a citizen of the state and has never paid any taxes, and is consequently a state case. But the expense of caring for him is very slight, and I believe that although he has an opportunity to escape every hour of the day, he is content to remain where he is.

Dr. Carson then brought in the patient referred to, and demonstrated him to the Association, the members examining freely and asking questions, which were answered by Drs. Carson and Shea.

Adjourned.

ABSTRACTS, REVIEWS, NOTES AND NEWS

Boards of Health are asked to send the Managing Editor notes of not more than one hundred and fifty words relating to new regulations passed, legal cases prosecuted, outbreaks of infection, unusual problems encountered, or other matters the publication of which may further the attainment of the objects of the Association.

AN EXPERIMENT WITH COPPER SULPHATE, THE NEW ALGACIDE.

In connection with the use of copper sulphate in reservoirs, as an algacide, the writer has noted that while concentrations of only .25 parts of copper sulphate per million of water* have sufficed to destroy the anabaena and kindred organisms, some other objectionable algæ† survive in a solution one thousand times as concentrated, and that if enough copper is added to kill these more resistant organisms, the fish in the reservoir will be killed.‡

Most species of fish do not survive a concentration of copper sulphate of ten parts in one million of water. What causes their death? Experiments with warm-blooded animals show them to be less susceptible. It is not possible that the proteid cell contents of the gills of fish are precipitated by copper sulphate in certain concentrations? The writer isolated cell albumin from both animal (egg white—diluted and filtered) and vegetable (yeast) sources, and observed that this substance is precipitated by as little as ten parts of copper sulphate in one million parts of water, and is not precipitated, apparently, by such concentrations as suffice to kill anabaena; namely, one part or less in one million.

It would seem, therefore, that in reservoirs which are over-treated with copper‖ the fish have been killed by the precipitation of albumin in the superficial cell layers of the gills, thereby strangling the fish.

From the classic work of Drs. Moore and Kellerman one would

* At Winchester, Kentucky, July, 1903, and July, 1904.
† Moore and Kellerman, Bureau of Plant Ind., Bul. No. 64.
‡ Caird, Eng., *News*.
‖ Elmira, N. Y., 1903. *Eng. News*, loc. cit.

deduce that the death of algæ is produced by this same precipitation, and that the difference in resistance among algæ is probably due to differences in the structures of different vegetable cells.

The concentration which will kill most fish may be detected by the tongue of the casual observer, and the writer and three others were able to detect as little as two parts of copper sulphate in a million of distilled water, one-fifth of the above.

The writer believes that even if the applied copper should remain long in solution, which it does not, its presence in excessive amount would be detected by taste. Therefore, it may be used by competent hands with entire safety.

ROBERT SPURR WESTON.

THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS organized June 6 at Atlantic City, N. J., during the meeting of the American Medical Association. The officers elected were: President, Trudeau; vice-presidents, Osler, Biggs; executive committee, Hurty, Otis, Klebs, Ravenel, Devine; directors: Massachusetts, Bowditch, Otis; Connecticut, Foster; New York, Biggs, Trudeau, Devine, Knopf; Pennsylvania, Flick, Ravenel, Anders, Pearson; New Jersey, Hoffman; Maryland, Welch, Osler, Jacobs, Fulton; District of Columbia, Sternberg; North Carolina, Minor; Colorado, Soley; Illinois, Klebs, Babcock; Minnesota, Bracken; Mississippi, Porter; Indiana, Hurty; Michigan, Vaughan; Ohio, Probst; California, Briggs; Texas, Smith; U. S. P. H. & M. H. S., Wyman; U. S. Army, Bushnell.

The objects of the society are: The study of tuberculosis in every detail; the dissemination of knowledge concerning every phase of the disease,—cause, treatment and prevention; and the encouragement of scientific treatment and prevention.

We are rather struck by the relatively small number of public hygienists amongst the directors, although those selected are preëminently well fitted to deal with the subject. Since tuberculosis is peculiarly a preventable disease, and much of the work of its suppression must be in the hands of those officially charged with the conservation of the public health, it seems to us that at

least every official state hygienic society or association in this country should have in its own hands the election of a director of the National Society from its own membership. Only in some such way can the full benefit of coöperation and advice be secured.

INOCULATION OF SMALLPOX VIRUS NEGATIVED BY VACCINATION.—Fink, civil surgeon in Burma, gives notes* regarding vaccination preventing inoculation smallpox, which quite equal in interest the classic experiments made in Massachusetts early in the nineteenth century. It seems that the Burmese outside of the large cities and towns practice and have great faith in, the inoculation of the powdered scabs from mild cases of smallpox as a preventive, and were slow to accept vaccination as a milder and equally efficient substitute, until convinced by the following experiments: During 1900 and 1901, 144 children were vaccinated. Of these, 123 were inoculated by the native saya, or medicine man, in 1903. None of them contracted the disease, nor did any one of the remaining 21 children, who, although not inoculated, were exposed to infection without the smallest precaution.

THE "CONSCIENTIOUS OBJECTOR" IN LONDON.—Collingridge† comments on the law passed in 1898, known as the "Conscientious Objectors' Act," as follows: "The decline in the proportion of conscientious objections during a year when smallpox was epidemic is some indication of the little faith the average anti-vaccinationist attaches to his own teachings, when face to face with the disease."

Smallpox was prevalent in London from 1900 to 1902. The ratio of infants exempted from vaccination in the city of London under the Conscientious Objectors' Act of 1898 is given by Collingridge, thus:

In 1898, 7.0 % of the births	In 1901, 2.6 % of the births
In 1899, 2.3 % of the births	In 1902, 0.6 % of the births
In 1900, 1.9 % of the births	In 1903, No cases of objection(!)

S. W. ABBOTT, M. D.

* *British Medical Journal*, July 16, 1904.
† Rep. Med. Off. of Health of City of London, 1903.

It may be suggested that perhaps the lack of objection in 1903 was due less to the conversion of the objectors than to their demise during the epidemic. It will be remembered that "antis" of all descriptions are particularly hard to convert, showing little mental reaction to facts. At least four more or less prominent anti-vaccinationists in this country, one of them "Citizen George Francis Train," suffered in their own persons from smallpox during the late outbreak. The only one of these whose opposition to vaccination came to an end as the result of his personal experience was the Chicago man. He died during the attack.

MAJOR REED'S RESULTS IN YELLOW FEVER.— The incorporation of a society, of which Dr. Daniel C. Gilman is president, to provide for the erection of a monument to Dr. Walter Reed, recalls the principal points established by the classical work on yellow fever of himself and his associates, Carroll, Lazear and Agramonte. These were as follows:

1. The specific agent of yellow fever (as yet unknown) resides in the blood of the patient for the first three days of the attack only. During this period only can the patient serve as a source of infection, and only in two ways: by direct (always experimental) transfer of his blood into the circulation of a susceptible person; and by indirect transfer, through a mosquito, *Stegomyia fasciata.*

2. This mosquito, to become infected, must bite the patient during the first three days of the attack. The mosquito's bite thereafter is harmless, until about twelve days later, after which, and so long as the mosquito lives, it may infect by biting.

3. There is no other natural method for the transmission of yellow fever than through the bite of an infected mosquito; fomites are not a factor in the transmission of this disease, and disinfection, except as directed against the mosquitoes, is quite useless as a preventive.

THE ASSOCIATION OF EXECUTIVE HEALTH OFFICERS OF ONTARIO held its nineteenth annual meeting at Sarnia, Ontario, July 13 and 14. Dr. Hodgetts, the new secretary of the Provincial Board of Health, read a paper on consump-

tion, which resulted in the passing of a resolution requesting the government to make notification of tuberculosis compulsory throughout Ontario.

AN UNRECOGNIZED SOURCE OF TYPHOID INFECTION. —Barringer* states that over 85,000 persons travel each mile of railway roadbed in the United States annually. The excreta must of necessity foul the roadbed, since the deposits are made just outside the track, favoring rapid desiccation and dissemination by the wind. Students arriving at the University of Virginia in the fall usually furnish from one to three cases of typhoid fever in each year, all appearing within a fortnight after the railway journey, and apparently due to infection contracted *en route*.

"The remedy lies in the retention closet. A good, dry earth closet would suffice, and could be used on every train. It would prevent soiling the roadbed, and be inoffensive."

S. W. ABBOTT, M.D.

RELATIVE EFFICIENCY OF CARBOLIC ACID, FORMALDEHYDE AND CYLLIN AGAINST B. PESTIS.

Experiments undertaken by Dr. E. Klein (*Public Health*, June, 1904, p. 563) to determine the action of carbolic acid, formaldehyde and cyllin (a trade-marked creolin) against a virulent strain of *B. pestis*, originally derived from the bubo of a fatal case in a man in Cardiff in 1901, led to the following conclusions: 1. Phenol 1 in 80 is a stronger disinfectant for *B. pestis* than formalin 1 in 30. 2. Phenol 1 in 80 stands in about the same position as cyllin 1 in 2400, inasmuch as both failed to completely devitalize the *B. pestis* in 5 minutes, though they both succeeded in doing so in 10 minutes. Expressed in a different form, cyllin possesses for watery emulsions of *B. pestis* a disinfecting power which is more than 27.5 (in fact, about 30) times as great as that of absolute phemol.

CHARLES HARRINGTON, M. D.

NOTES ON FORMALDEHYDE.

Formalin is commonly described as a 40 per cent solution of formaldehyde in water, but it is well known that that is the maxi-

* *Medical Record*, Dec. 19, 1903.

mum possible strength and that the commercial article is rarely as strong. The analysis of 21 samples is reported by E. F. Ladd (*North Dakota Agricultural Experiment Station, Bulletin, No.* 60), who found from 21.6 per cent to 38.47 per cent, and in a majority of the samples about 33 per cent.

With regard to the influence of temperature in formaldehyed disinfection, Bonhoff (*Berliner klinische Wochenschrift*, 1904, No. 19) makes the interesting statement that, in winter, anthrax spores are not destroyed even when larger amounts of formaldehyde than usual are employed. He believes that the influence of temperature is underestimated and that it is important in cold weather to raise the temperature of the room, rather than to increase the dose.

A case of suicidal poisoning by formalin is reported by Dr. L. A. Levison (*Journal of the American Medical Association*, June 14, 1904). The amount taken was estimated at 2 or 3 ounces, and the victim died in about 20 minutes, after intense suffering. The stomach, esophagus, duodenum, and all organs and tissues in contact with the stomach were found to be hardened like leather.

CHARLES HARRINGTON, M. D.

TYPHOID FEVER OUTBREAK AT KINGSTON, ONT.—Kingston receives its water supply from the main current of the St. Lawrence River, conducted through a pipe, the intake of which is about 1,500 feet out from the shore. The sewer outlets open into the river at the shore line. Amyot, provincial bacteriologist, analyzed water sent by the Kingston authorities chemically and bacteriologically. The chemical results were indefinite, but the water was found to contain colon bacilli and streptococci. He was commissioned to investigate the conditions. He found that the sewage discharged at the shore line was swept downstream so rapidly that it did not extend outward to the water intake, despite the short distance between the outlets and the intake. Colon bacilli and streptococci were absent at the intake and for about 700 feet inward along the course of the pipe, when they began to appear. Investigation of the pipe was suggested, and finally a bad leak was located about 500 feet from the shore,

and hence in the sewage-infected area. The leak was traced to the efforts of two tugs to release a ship's anchor which had fouled at this point. The tugs gave up after the chain broke, and both chain and anchor were found, the latter lying under the bent pipe. The pipe was repaired with cement and iron hoops, the colon and streptococci disappearing almost at once from the city water, and the typhoid fever diminishing two weeks later.

The experience of Kingston calls attention once more to the folly, already well established at Toronto and at Chicago, of carrying a water supply, however pure, through a sewage-polluted area, without perfectly sound methods of protecting the water in transit, as well as at its source. It is to be hoped that Kingston will not rest content with the repaired pipe, but remodel its system of water conductors to the point where the lives of the inhabitants are not at the mercy of every passing ship.

DEATH OF A NOTED SANITARIAN.—Sir John Simon died at his house in Kensington Square, London, on Saturday, July 23, in the eighty-eighth year of his age. His medical career, which began in 1833, continued until 1848, when he was elected to the newly constituted post of medical officer of health to the city of London, an appointment which may be credited with having turned his studies in the direction of preventive medicine. In 1855 he was appointed to another newly created office, that of medical officer to the Privy Council. Subsequently, he was for a short time a member of the local government board. He resigned the office in 1876 and was made a crown member of the General Medical Council, from which he retired in 1895. He has been the recipient of many degrees and honors. Sir John Simon was preëminent among English health officers, and his death removed another of the pioneers of sanitary science.

R. S. Weston.

INDUSTRIAL DISEASES.—Whitelegge* reports upon the cases of lead poisoning, phosphorous poisoning, arsenic and mercurial poisoning, and from anthrax in different industries in

* Ann. Rep. Chief Inspector of Factories and Workshops, 1904, London, June, 1904, p. 264.

England in 1903. Under the operation of the recent act requiring notification of these forms of illness, it appears that the cases of lead poisoning have been reduced from 1,258 in 1899 to 614 in 1903, or to less than half. Of these cases, 37 occurred among smelters of metals, 13 among printers, 24 in file cutters, 18 in tin and enamel workers, 109 in white-lead workers, 97 in china and earthen-ware makers, 28 in makers of electrical accumulators, 39 among paint and color workers, 74 in coach makers, 24 in ship-building, and 151 in other industries.

There were 5 cases of industrial arsenical poisoning, 8 of mercurial poisoning, and 47 of anthrax.

A summary of the cases of anthrax is given for the 5 years, 1899–1903. The whole number of reported cases was 211, most of which were among workmen in wool, horsehair, hides and skins. The situation of the pustule in the persons attacked was upon the neck in 84, the cheek in 31, the forehead in 14, the forearm in 16, the upper eyelid in 12, the angle of the jaw in 8.

S. W. ABBOTT, M.D.

SANITARY ENGINEERING.

BY ROBERT SPURR WESTON, M. A.,
Assoc. M. Am. Soc. C. E.

SEWAGE DISPOSAL AT YORK, ENGLAND. CHANGES IN METHOD DURING THE PAST TEN YEARS. (Alfred Creer, A. M. Inst. C. E., "The Surveyor," 1904, pp. 623 to 631.)

In 1894 York, England (population 79,114 in 1902), completed a chemical precipitation works at a cost of about $135,000. These works were in operation as precipitation tanks, using lime and alumino-ferric, until April, 1899, when some of the tanks were transformed into open septic tanks, and experiments were started with a hope of improving the character of the effluent, which was then causing complaint. Using the precipitation system, the cost of treating 1,000,000 gallons by the original process, exclusive of interest and sinking fund, but inclusive of sludge pressing, was about $9.74 a million U. S. gallons. The experiments, all on a large scale, may be outlined as follows:—

Experiment No. 1.—*Covered Septic Tank and Single Contact.* Tank, 48,000 gals. capacity; four filters, each 40 ft. x 20 ft. x 3 ft. Cycle, 8 hours; medium clinker, $\frac{3}{4}$ in. to $1\frac{1}{2}$ in.; rate, 250,000 to 700,000 gals. per acre per 24 hours.

Experiment No. 2.—*Crude Sewage and Double Contact Beds.*—No. 1 bed, 90 ft. x 30 ft. x 2.75 ft.; medium clinker, $1\frac{1}{4}$ x 3 in. No. 2 bed, same size as bed No. 1, filled with medium clinker, $\frac{3}{8}$ x $2\frac{3}{4}$ in. Cycle, 8 hours principally.

Experiment No. 3.—*Ladder Filter, Crude Sewage and Multiple Contact Bed.*—Filter made up of 10 compartments, each 4 ft. x 3 ft. 5 in. x 2 ft. Medium clinker, $\frac{3}{8}$ in. to $\frac{3}{4}$ in. The 10 compartments were arranged in steps, each 6 inches below the one immediately above it. The sewage passed from the first compartment to the second, and so on through the series.

Experiment No. 4.—*Open Septic Tank and Continuous Filter.*—This filter, which is still in operation, is circular, 67.5 ft. in diameter, and was specially constructed, with perforated walls and drains so that free access of air to all parts of the bed might be maintained.

A distributor delivers the sewage in the form of small jets equally over the area of the filter. The sewage trickles down through the filter, emerging at the floor level as a clear and bright liquid, totally devoid of smell and purified to a greater degree than was the effluent in any of the other experiments.

Experiment No. 5.—Open Septic Tank and Double Contact.—The sewage used during these experiments analyzed about 30 parts of "Oxygen Consumed" and 4.6 parts of "Albuminoid Ammonia" per million.

Results.—Experiments Nos. 1, 2, 3 and 5 were discontinued in August, 1901, as Experiment No. 4 was so successful. Experiment No. 4 was interrupted between March 12 and May 7, 1902, to allow the construction of a grit chamber in the connected septic tank. This grit chamber increased the efficiency of the filter. The filter, previous to the end of March, 1904, had been in operation for three years and nine months, and is still producing an excellent effluent at the rate of about 2,200,000 gallons per acre per 24 hours.

The city has recently constructed a second continuous filter, having over twice the area of the first one. Experiments with filtering material point to the probable superiority of coke and clinker over broken bricks and the so-called honeycomb slag.

The operation of the septic tank gave some valuable data. Mr. Creer thinks that the sludge should be removed once in every two or three weeks. He found that one cubic yard of sludge, containing 55 per cent of non-combustible mineral matter, was produced for each 348,000 gallons of sewage.

The period of storage in septic tank was between 19 and 20 hours, but repeated analyses showed very little, if any, reduction in the oxygen consumed and albuminoid ammonia after 13 hours of storage.

The action of this septic tank upon suspended solids is interesting because of the total quantity entering the tank, 75 per cent was organic and 25 per cent mineral water, but on leaving the tank the suspended solids had been reduced to 58 per cent composed of 73 per cent of organic and 27 per cent of mineral matter.

SHEFFIELD, ENGLAND. In this connection it is interesting to

note that the city of Sheffield, England, has decided to adopt the septic tank and contact bed system. This decision also was based upon the result of a series of experiments. Sheffield has acid sewage, while that of York is distinctly alkaline. These facts are evidence that no one system has been devolved which will treat successfully the sewage of all localities, and that each locality should follow the scientific method, as have these two English cities.

TREATMENT OF PLUMBO-SOLVENT, MOORLAND WATERS IN WAKEFIELD, ENGLAND. (Smith and Chaplin, Brit. Assoc. W. W. Eng., Hull meeting, July, 1904.)

Houston (Supplements to Reports Loc. Gov. Bd., 1900 to 1902) showed that by contact with peat water acquires that acidity which enables it to dissolve lead pipe, and that this acidity is probably produced by bacterial growth.

At Wakefield, the water is treated temporarily with sodium carbonate, 415 pounds being sufficient for 1,000,000 gallons of water. This reduces the plumbo-solvency of the water in a satisfactory manner.

Experiments were conducted to determine upon some other, and, if possible, a more economical method. Sand beds were found to neutralize the water for a short time only, or until the alkalinity of the filtering material was neutralized. It was arranged to give the water a treatment with chalk, following the treatment with filtration and a second treatment with clear lime water. Fifteen parts of chalk and from 15 to 30 parts of lime per million of water gave satisfactory results.

POLLUTION OF STREAMS BY WOOD PULP. (Jour. Franklin Inst., June, 1904.)

The U. S. Geological Survey, coöperating with Prof. F. E. Robinson of Bowdoin, is continuing its investigation into the pollution of the Androscoggin and Penobscot rivers. Twenty-five analyses have been made, but as yet no record of conditions which existed during dry summer seasons has been obtained. The work which the Survey now proposes to undertake will be directed toward a

determination of the effect of wood pulp wastes upon natural waters. Pollution of streams in the vicinity of Lake Champlain has brought the subject to the fore.

The plans made contemplate a precise determination of the characters of sulphite and soda pulp wastes and their respective stabilities. Having determined the characters of the wastes, it is important to note whether each waste is of itself highly putrescible, or whether it has characteristics similar to those of strawboard waste, stable itself, but affording abundant opportunity for the decomposition of matters brought in contact with it. The effect of wood pulp waste upon streams will also be studied. Already it has been found that these wastes have a bad effect when discharged into streams which are used afterwards in connection with the cloth-dyeing industry.

SOLUBILITY OF ATMOSPHERIC OXYGEN IN SEA WATER AND IN WATER OF DIFFERENT DEGREES OF SALINITY. (F. Clowes, Jour. Soc. Chem. Ind., 1904, XXIII, p. 358.)

It is usual to measure the injurious effects produced by the discharge of sewage into bodies of water by ascertaining the extent to which the dissolved oxygen has become reduced in amount by the addition of foreign liquids. It has been known that sea water dissolves about 80 per cent as much oxygen as does distilled water. Experiments show that the solubility of atmospheric oxygen diminishes regularly with the addition of sea water to distilled water.

NUMBER OF BACTERIA IN THE WATER OFTHE NORTH SEA, AND THE EFFECT OF SEA AND RIVER WATER AND OF BIOLOGICAL TREATMENT ON THE NUMBER OF BACTERIA PRESENT IN SEWAGE. (F. Clowes. Jour. Soc. Chem. Ind. Loc. cit.)

The author has made a careful investigation of the bacterial flora of the North Sea in the part known as the Thames Estuary. The results show that the average number of 7,443,000 bacteria per c.c., which were present in the sewage effluents discharged from

the Barking and Crossness outfalls, had become reduced by the action of the river water to 4,840 at a distance of 21 miles from Crossness, and that off Southend, 31 miles from Crossness, a further reduction to 379 has taken place. When the Nore Lightship is reached the bacteria number only 186 per c.c. It also appeared that the intestinal bacteria in the sewage effluent were not found in the water at 27 miles below the point at which they had been introduced into the stream.

As is well known, the sludge from the London precipitation tanks is discharged into the estuary of the Thames from the holds of sludge steamers. The number of bacteria in a cubic centimeter of the discharged sludge is about 130,000,000, while the number found in the water after the discharge of the sludge was only 1,940. The number of bacteria in the river during an incoming tide, which represents the estuary water mingled with the sludge discharged into the estuaries, was only 458 per c.c. The water from the open sea contains an average of 287 bacteria per c.c. and what are ordinarily considered intestinal organisms were not found.

Experiments with the biological sewage purification plant showed that the settling tank effected a reduction of 15.8 per cent, and the effluent from the coke contact beds showed a reduction of 32.2 per cent, over the numbers of bacteria contained in the crude sewage. Samples of the effluent from the Barking coke bed show that this device had effected an 89 per cent reduction in the numbers of bacteria contained in settled London sewage.

The author concludes, therefore, that "no one has a right to consider the sewage bed as a means of increasing the number of bacteria. The bacteria rather appear to carry out their active functions in the bed and to pass away in large numbers in the effluent in a lifeless condition."

SEPTIC TANKS IN OHIO. (R. Winthrop Pratt, Mun. Eng., 1904, July, p. 34.)

There are 26 sewage purification works in Ohio, while 18 more will be in use in the near future. Of these, 26 plants, 8 use the

septic tank; of the 18 proposed plants, 14 will use it. Mansfield, with a population of about 20,000, has the largest septic tank and contact bed system. It is designed to treat 1,000,000 gallons per 24 hours. Descriptions of the construction and operation of several of the Ohio plants are given.

PANAMA CANAL: NATURAL CONDITIONS AFFECTING ITS CONSTRUCTION. (Gen. H. L. Abbott, Eng. Magazine, August, 1904.)

General Abbott, of national reputation, has compiled the meteorological data of the isthmus in an interesting article, in which he also discusses the sanitary conditions which will affect the construction of the Panama Canal. He says that "much wild exaggeration has been circulated, in great part founded on the experience of ill-acclimated laborers engaged in surface soil excavation." He quotes the excellent hospital records which were kept by the new canal company, which records show that during recent years the percentage of disease and mortality has not exceeded that on any large work in any country.

SPRING-WATER INSPECTION AT SPRINGFIELD, MASS.

All vendors of drinking water are required to have a license from the City Board of Health, which, before granting such license, analyzes the water, inspects the source of supply, and also the methods of collection and distribution.

UTILIZATION AND DISPOSAL OF MUNICIPAL WASTE. (William F. Morse. Jour. Franklin Inst. June, 1904.)

Municipal waste, comprising garbage, street sweepings, ashes and rubbish, is divided into the following approximate proportions:

	Percentage. By Volume.	Ash By weight.
Ashes	65	57
Street Sweepings	17	12
Garbage	10	10
Rubbish	8	30

The amount of municipal waste varies greatly in different localities, as shown by the following table:

City.	Lbs. per Capita.
New York	4.
Philadelphia	3.5
London	1.6
Hamburg	1.1
Berlin	0.9

Analyses of these various components of municipal waste are given. The average American city garbage is made up of

Moisture	65%
Solids	25%
Foreign Substances	6%
Grease	4%

The author gives the history of various methods for the disposal of garbage; namely, feeding to hogs, dumping, ploughing into ground, reduction and cremation. He evidently believes that the "utilization of such parts of the refuse as may be sold for conversion of manufacture into other forms of usefulness and the disposal of the worthless residuum" is the best method for large cities. In England some steam power is derived from the burning of garbage. Mr. Morse believes that the destruction of American waste in furnaces of the best English type may be achieved successfully without the use of fuel.

Hitherto, however, there is no record of a furnace which will consume garbage during the green-corn season without the aid of some other and better combustible.

EXAMINATIONS FOR SANITARY INSPECTORS IN NEW JERSEY.

All candidates for the positions of Sanitary Inspector or Health Officer in New Jersey cities must pass an examination and receive a certificate from the State Board of Health. The first examination under the new law was held in June. The subjects for examination were sanitary law, preventable diseases, isolation and

quarantine, disinfection, nuisances, collection and disposal of refuse, vital statistics, milk supply, etc. The first examinations were not very severe, as might have been expected, but the step is one in the right direction.

TYPHOID FEVER AT THE STATE HOSPITAL FOR THE INSANE AT MENDOTA, WIS. (Eng. News, 1904, LII, p. 94.)

The hospital had two sources of supply; namely, an artesian well and the lake water. The latter was sewage polluted. In spite of warning, the employees drank the lake water because it was more agreeable to their taste. An outbreak of typhoid fever followed.

SEWAGE POLLUTION OF QUAHAUGS, OR ROUND CLAMS, AT NEW BEDFORD.

Owing to pollution of the beds by sewage, the Massachusetts State Board of Health has requested the Fish and Game Commission to prevent the further taking of shellfish from New Bedford Harbor and from Clark's Cove. This ruling will seriously affect the "Little Neck" clam industry in these localities. It is a well-known fact that this family of shellfish congregates most thickly about the outlets of sewers.

PREVENTIVE THERAPEUTICS.

BY HERBERT D. PEASE, M. D.,

Director, N. Y. Antitoxin Lab., Albany, N. Y.

DIPHTHERIA ANTITOXIN.—A committee of bacteriologists engaged in antitoxin production, and some others, was selected in the fall of 1902 by Prof. J. P. Remington, chairman of the committee on revision of the U. S. Pharmacopœia, to advise with him concerning the introduction of diphtheria antitoxin into the next issue of the U. S. Pharmacopœia. This committee has recently reported, advising that diphtheria antitoxin be introduced, suggesting its proper dosage, and the conditions under which it should be issued and distributed. If the committee on revision adopt these suggestions, diphtheria antitoxin will be one of the first remedies, if not the first, requiring a physiological test for the determination of its therapeutic activity which has been included in the Pharmacopœia. The committee consisted of Dr. Theobald Smith as chairman, and Drs. W. H. Park, J. J. Kinyoun, E. M. Houghton, M. J. Rosenau, H. A. Hare, H. D. Pease, and Surgeon Craig of the Army Medical Srvice.

The committee on antitoxic and immunizing sera of the laboratory section of the American Public Health Association, composed of the same gentlemen, except Drs. Houghton, Craig and Hare, and with the addition of Dr. Joseph McFarland, are undertaking the standardization of the technic of testing the specific antitoxic strength of diphtheria antitoxins.

TETANUS ANTITOXIN.—Marie and Morax* have shown experimentally that tetanus toxin is absorbed and passed on towards the central nervous system by both motor and sensory nerves, through their axis cylinders, and is also absorbed by the sympathetic nerves in the same manner. The toxin enters the axis cylinders only through the distal nerve terminations. Certain nerves absorb toxin more rapidly and allow

* Ann. de l'Inst. Pasteuru Tome XVII., No. 5.

it to flow through them faster than others. In general, the length of nerve determines the rate of passage. The motor branch of the trifacial nerve in the horse absorbs toxin with great rapidity, and this fact probably explains the precocious appearance of trismus in horses infected with tetanus.

Meyer and Ransom* confirm the work of Marie and Morax, and further show that antitoxin present in or introduced into the circulating fluids of the body does not come into contact with any tetanus toxin present in the axis cylinders. In effect, the nerves are insulated throughout their course to all transfusion, either of toxin or antitoxin. The latter also does not seem to be adapted for absorption by the nerve terminations, as is the toxin. The authors, therefore, recommend the injection of tetanus antitoxin directly into the large nerve trunks in cases of this disease, as being the only method, in their opinon, of bringing the antitoxin directly into contact with the toxin already in the nerves.

Elting‡ has obtained temporary amelioration of the general convulsions in tetanus through injection, by the lumbar puncture method, of large doses (up to 50 c.c.) of tetanus antitoxin. These large doses produced no lesions demonstrable at autopsy.

Scherz† reports the use of immunizing doses of tetanus antitoxin in 436 injured persons, none of whom developed tetanus, while in the hospitals of the same region during the same period of time 7 cases of tetanus were found in persons who had not received prophylactic injections of serum.

Pease‖ classifies 53 cases of tetanus, occurring in New York state in 1903, according to their severity, into 3 groups: acute, subacute and chronic. Thirty-three were acute cases, 14 of which were, and 19 were not, treated with tetanus antitoxin. All the acute cases ended fatally. He places 12 cases in the subacute class, and of these, 7 died. Of these 7, 4 had been treated with antitoxin, and 3 not. Of the 8 chronic cases, 5 died, 3 having been treated with antitoxin, and 2 not so treated. No case not treated with antitoxin recovered, but the manner of collecting the records of the cases may have influenced this statistical result.

* Archiv fur Exp. Path. und Pharm., Band XLIX., Heft 6.
† *Albany Med. Ann.*, January, 1904.
‡ Centralb. fur Bakt. Erst Abt Ref. XXXIV., Nos. 18 and 19.
‖ *Med. Rev. of Rev.*, June, 1904.

"Local" tetanus, or early and distinguishable spasms of the part or member injured, occurred in 10 out of 46 cases in which observations on this point had been made. It is generally considered to be a rare symptom in man.

As indicating the time of year in which tetanus is most likely to occur, a study of the cases gave the following results: January and February, 1 case each; March, 4 cases; April, 6; May, 2; June, 10; July, 24; August, 6; September and October, 5 cases each; November, 4, and December, 2 cases. Eighteen of July's 24 cases were due to Fourth-of-July injuries.

RESEARCH IN JAPAN.—An interesting illustrated pamphlet has been issued in connection with the combined exhibits of the institutes for infectious diseases and serum and vaccine production of the Imperial Government of Japan at St. Louis. These institutes are presided over by Professor Kitasato, and indeed their existence is largely due to his work and efforts.

The first of these institutes consists of an infectious-disease hospital,—a dormitory, laboratory, stable and disinfecting plant devoted to original investigation and teaching. The results obtained are given as follows:

Diphtheria antitoxin used on 4,556 persons, with a death-rate of 10.5 per cent.

Tetanus antitoxin used on 74 persons, with a death-rate of 55.4 per cent.

Pasteur's hydrophobia treatment on 428 persons, with a death-rate of .24 per cent.

Prophylactic injections of so-called vaccines and of "antitoxins," and the therapeutic use of the latter in hospital cases and epidemics of cholera, typhoid fever and dysentery, are reported. Investigations into the treatment of tuberculosis, leprosy and erysipelas, and the etiology of malaria, beriberi, cancer and syphilis, have also been carried on.

For this institute an appropriation of about $30,000 was made in 1903.

The serum institute for producing antitoxins and vaccines (except for smallpox) consists of a main laboratory, plague labora-

tory and the stables and outbuildings. The illustrations and descriptions of these buildings show them to be of a high order and very attractively situated.

The tabulated results obtained from the use of diphtheria antitoxin in Japan, from 1889 to 1902, show the usual 50 per cent reduction of the death rate in this disease, although the number of cases of the disease has greatly increased since 1896.

Plague serum production is described, and the results of its use in Formosa in 1901 are given as follows: Cases treated, and those not treated, 56 each. Death-rate of the treated cases, 33 per cent; not treated, 62 per cent. Plague vaccine is also produced, and in 200,000 inoculations, but few cases have been known to occur subsequently.

The appropriation for this institute was over $50,000 for 1903. The work of the lymph or vaccine institute is described, and the method of producing the non-humanized lymph ofUmeno is given in detail. This institute receives about $28,000 a year. Dr. M. Miyashima, of the latter institute, came to this country in charge of this exhibit at St. Louis, and has been making a tour of the various vaccine and antitoxin laboratories here.

SERUM USED PER CASE OF DIPHTHERIA IN NEW YORK STATE.—In a forthcoming report of the New York State Department of Health for the year 1903, a table appears showing the relative frequency with which the physicians of that state use the different sized packages of diphtheria antitoxin. The serum is issued in two sizes, of 1,500 units and 2,500 units respectively, and the table shows that 45 per cent of the individual doses were of the latter size, 10 per cent were of 3,000 units, and another 10 per cent were of 4,000 units or over. The death-rate in 1,033 cases was 8.6 per cent.

VETERINARY SANITATION.

BY VERANUS A. MOORE, D. V. M.,

Cornell University, Ithaca, N. Y.

MUZZLING DOGS TO PREVENT RABIES.—The Board of Agriculture of Great Britain began six years ago to enforce the muzzling

of dogs. In 1895, 672 cases of rabies in dogs were reported; in 1896, 438 cases; in 1897, 151 cases, and in 1901, only 1 case.

VACCINATION AGAINST TUBERCULOSIS IN COWS.—The Pennsylvania State Live Stock Sanitary Commission recently reported progress for the year at the Harrisburg meeting. Cattle vaccinated against tuberculous and exposed thereafter for a year to daily contact with tuberculous animals remained sound, as also did vaccinated calves allowed to run with tuberculous mothers, and using their milk. Control animals succumbed.

ANTHRAX IN ONTARIO.—In the summer of 1902 on a farm adjoining the village of Ancaster, three cows died after a very short sickness, and were pronounced anthrax by the local veterinarian. A fourth cow, dying at the same time, was autopsied under the impression that it did not have anthrax. During the autopsy, which was done on the barn floor, a considerable amount of bloody fluid ran down into the root-cellar below. The first three cows were burned, but the autopsied cow was buried in an oat field.

In the fall mangolds were stored in the root-cellar, and fed to the cattle during the winter. About the time that the mangolds in contact with the floor were reached, three cattle died. Anthrax was suspected, and the bodies were burned. A fourth cow was buried in quicklime, but one foot was left exposed. Amyot, provincial bacteriologist, was sent to investigate. He found anthrax bacilli in the projecting foot of this cow, in the body of the cow burned in the oat field, and on the walls of the root-cellar, down which the autopsy fluids had run. In tracing the origin of the anthrax, he found that for thirty years or more batches of three or four cattle had died mysteriously at intervals of one, two or three years. Poisoning had been suspected. The farms where deaths occurred were almost without exception in a district of low land subject to flooding from a small stream. The exceptions could be traced to the pasturing of cattle from other farms on this low land in droughty seasons, or to "nice black soil" carted thence to high-lying farms. Evidently this low-lying land had

been infected in some way. Inquiry showed that up to twenty-five years before, a large woolen mill, employing 150 hands, and dealing to some extent with foreign wools, had been in operation on the banks of the stream mentioned, and above the infected area.

Amyot points out the longevity of the infection, renewed, doubtless, from time to time by the small outbreaks, and calls attention to the necessity for investigating the conditions in factories, tanneries, etc., which handle "foreign" wools and hides. He states that six large Canadian tannery districts are now infected with anthrax, and urges action to restrict the extension of the disease.

PERSISTENCE OF ANTHRAX SPORES.—Von Szekeley* found anthrax spores, alive and virulent to white mice, in gelatin cultures inoculated eighteen and one-half years before and kept at ordinary room temperatures, in diffuse daylight, and under conditions favoring moderately rapid drying. The spores of the bacillus of malignant œdema also remained alive and virulent under simular conditions for the same period.

MUNICIPAL SANITATION.

BY CHARLES V. CHAPIN, M. D.,

Superintendent of Health, Providence, R. I.

IMMUNIZATION AGAINST DIPHTHERIA.—Early in the year the Dept. of Health of the City of New York issued to physicians a circular, setting forth the value of this procedure. It was stated that of 13,000 persons in New York City immunized with diphtheria antitoxin, and presumably exposed directly to the disease, only 40, or .3 per cent contracted diphtheria, and only 1 of these cases died. It was strongly urged that when diphtheria occurs in a family, every well child be at once immunized. The dose recommended for this purpose is 300 units for children under two, and 500 units for all persons older than this. No details are given in the circular in regard to the above data, but from other sources it may be inferred that cases occurring within

* *Zeit. Hyg. u Inf.* 1903, XLIV., No. 3.

twenty-four hours, or later than thirty days after immunization are not reckoned as failures. J. S. Billings, Jr., gives* many interesting facts in regard to the use of antitoxin in the city of New York. He states that of 5,479 persons immunized by department inspectors, from March 1, 1902, to Jan. 1, 1903, 17 were taken sick between two and thirty days after immunization, and 7 before two or after thirty days. This makes, all told, only a little over .4 per cent in which immunization was followed by diphtheria. A study of the chance of secondary cases occurring in an infected family shows that if no immunization had been practiced, probably from 700 to 800 cases of diphtheria would have developed, instead of the 24 reported. The results obtained by private physicians are not quite as favorable. Of 2,864 cases of immunization, the disease occurred in 1.4 per cent. The experence of New York, as well as other cities, seems to indicate that to obtain the most prompt and general use of antitoxin, it is necessary that it be not only furnished but also administered by health-department officials whenever requested. In New York the department goes so far as to urge personally, or by telephone, upon every physician reporting diphtheria, the prompt use of antitoxin on both sick and well. In Baltimore,† of 1,151 cases of immunization, 6 cases, or a little over .5 per cent, were attacked. The usual dose was 500 units, but in the 251 cases where 1,000 units were used, there was no recurrence. The latter dose is recommended in that city.

NUTRITIVE VALUE OF FOODS.—Boards of health are generally active in the prevention of the sale of decayed, diseased and adulterated food materials. Of late they have undertaken a campaign of education in regard to proper methods of producing and handling milk, and in some instances, at least, have entered upon the business of distributing to infants sterilized or clean milk. One important phase of the food problem seems thus far to have been neglected by health officials. It is important for all, but especially for the wage-earning class, that money spent for

* *N. Y. Med. Jour.*, Dec. 12, 1903.
† *Rep. Health Dept.*, 1902, p. 141.

food should bring the greatest possible return. A vast amount of data has of late been collected in regard to the nutritive value of foods as related to cost. It would appear to be time for this knowledge to be popularized, and the York (England) Health and Housing Reform Association have issued, for general circulation, a small sheet, on which is represented graphically the nutritive value of the more common food materials. There is also some explanatory matter in easily understood language. This form of sanitary education is one which might well be taken up by health officers in this country.

MILK AND FOODS.

BY CHARLES HARRINGTON, M. D.,

Asst. Prof. of Hygiene, Harvard Med. School.

IS ANY PART OF A MILKING BACTERIA-FREE?—One sometimes hears it stated that the milk that is drawn after the "fore-milk" is, to all intents and purposes, free from bacteria; and again, on the contrary, that even the "strippings" may be fairly rich in bacteria,—even 500 per cc. Recent studies by A. Lux* support the latter contention, and demonstrate further that the first milk drawn often contains fewer bacteria than the middle milk and strippings. The element of time appears to have considerable influence, for milk drawn from the same teat, after intervals of varying length (two to twenty-four hours), yielded them the more generously the longer the interval. Thus, in one instance, the range was from 65 to nearly 3,000 per cc., and in another, from 22 to more than 1,200.

BACTERIA OF MILK DUCTS.—It is generally understood that the small residuum of milk in the ducts after milking acts as a pabulum for the teat bacteria, enabling them to go on multiplying during the periods of rest; but if Uhlmann is correct in his assertions,† milk is never present in the capillary ducts, except in minute amounts, and is commonly absent. Upward of a one thousand

* *Centralb. fur Bakt. u Parasit.*, 2 Abth., XVII., pp. 195 and 267.
† *Thesis*, Jena, 1903.

sections of thirty-five teats were stained and studied. Although milk was commonly basent, every section showed bacteria, chiefly micrococci, in small, and occasionally in large, numbers.

ACTION OF FORMALDEHYDE ON THE DIGESTIBILITY OF MILK.—Certain eminent German and English authorities have recently advocated the chemical treatment of milk as a means of diminishing the bacterial content thereof, and thus bringing about a diminished infantile death-rate. Formaldehyde has commended itself to their consideration as an agent which, contrary to general belief, is incapable of exerting any harmful influence on the digestibility of the casein. That this agent does exert such an influencehas been proved once more by Trillat,‡ who found that casein from fresh, untreated milk was from 5 to 6 per cent more digestible than that from milk to which formaldehyde had been added to the extent of 1 part in 20,000 (about a half of a teaspoonful of commercial formalin to 5 gallons), and about 30 per cent more so than casein that had been treated with dilute formaldehyde (1:20,000 water) after it had been separated by means of rennet. The local action of the antiseptic in the stomach is additional ground for prohibition of its use.

THE FATE OF TYPHOID BACILLI IN BEER.

Professor Surmont of Lille, France, has been testing the beer made there, in respect to its effect on typhoid germs. He found that the cultures of typhoid bacilli added to the beer were all killed in one-half to 67 hours, the bactericidal effects being most pronounced in proportion to the amount of lactic acid in the beer; the acetic acid had also a lesser influence of the same kind. The beer, as it is manufactured, is evidently a hygienic drink, but when water is mixed with it, as frequently occurs, the germs in the water may prove a source of infection. Beer weak enough to allow survival of bacteria becomes more bactericidal as it ripens, as the bacilli in it generate more lactic acid, which in turn has a destructive action on them.—*Public Health*, June, 1904, p. 529.

‡ Compt. rend., 1904, CXXXVIII., p. 720.

MEAT POISONING AND PARATYPHOID.

In 1901 there was, in Düsseldorf, an outbreak of more than 50 cases of meat-poisoning due to eating horsemeat in an almost or quite raw state. One of the victims, a boy of nine, died, and from his spleen was isolated a very motile, short, thick bacillus, with rounded ends. This proved to be highly pathogenic for mice and guinea pigs. Dr. H. Trautmann (*Zeitschrift für Hygiene*, Vol. XLV., p. 139), who isolated it, has made a comparative study of this and other forms of bacteria obtained by others from other outbreaks, and of various strains of paratyphoid bacilli of types A and B, and has come to the conclusion that though differing widely in shape, size, growth, staining, spore formation and behavior on culture media, they show no fundamental difference and are merely varieties of the same organism; so he puts them all under the general head of *Bacillus paratyphosus* and divides them into five groups according to their agglutinating properties, the members of one group exerting a greater influence upon one another than against members of the other group. All of the most widely known meat-poisoning bacteria, as Van Ermengem's *B. botulinus*, Gaertner's *B. enteritidis*, and Basenau's *B. bovis morbificans*, are included.

ANOTHER CAUSE OF BERIBERI.

According to G. Maurer (*Geneeskundig Tydschrift voor Nederlandsch-Indie*, XLIII., p. 336, through *Biochemisches Centralblatt*, May, 1904, p. 542), both beriberi and psilosis are consequences of intoxication by oxalic acid produced in the intestine. Von Uchermann (*Centralblatt für innere Medizin*, June 18, 1904), after an investigation of cases occurring aboard ships, is convinced that the disease is an intoxication and not an infection; that it is closely related to scurvy, and that it is caused by the exclusive use of preserved foods. In this connection, it is interesting to note that M. Coplans (*The Lancet*, June 18, 1904) attempts to show that scurvy in adults is probably a specific bacterial disease rather than the result of the lack of particular kinds of food. He instances an outbreak of the disorder in a military camp in South Africa, where the food was identical in quality and kind with that

of other camps in which no scurvy occurred. In the camp in question, the sanitary condition was very bad, and those who were seized were neglectful of personal hygiene.

DESTRUCTION OF TUBERCLE BACILLI IN MILK.

After it had been asserted by Hesse and others, that milk containing tubercle bacilli could be rendered harmless by heating to 60° C. for 20 minutes, it was shown by Professor Theobald Smith that the pellicle which forms on the surface may offer such protection to the bacilli that they do not succumb to an exposure of a half hour to 65° C.; and now Dr. W. Rullmann (*Münchener medicinische Wochenschrift*, 1903, No. 31, p. 1342) reports that even with constant agitation as a preventive of the pellicle and with the observance of every precaution, including that of maintaining a constant temperature, he was unable to destroy added bacilli in a half hour with a temperature of 65° C.

NEW SOURCES OF LEAD POISONING.

Attention is called by Dr. Y. C. Gibson (*Australasian Medical Gazette*, April 20, 1904) to the possibility of painted rails and walls as frequent sources of lead poisoning in children, especially those who bite their nails and suck their fingers. He says that cases are most numerous during hot weather, when the paint is softened and less adherent. Another source of poisoning, according to Dr. Lefour (*Presse Médicale*, May 14, 1904), is wallpaper. He reports the case of a woman whose urine showed 1 milligram of lead per liter, the cause of which was thought to be the wallpaper, which contained considerable lead. He obtained a lot of different papers from a dealer and found that most of them contained lead.

PREVENTING THE BACTERIAL CONTAMINATION OF MILK.—Investigations conducted by Fraser* to determine the relative effect of the different dairy operations upon the bacterial content of the milk, point to the cow herself, and particularly to the udder, as the chief source of bacteria and of dirt. Agar plates were exposed, usually for one minute, near the milkpail during

* *Ill. State Bull.* No. 99, p. 219.

numerous tests showed reduction of the bacteria, from washing the udder before milking, from 578 bacteria to 192. The dirt was also directly estimated. Taking the amount of dirt found in the milk after thorough washing of the udder as a standard, unwashed udders, apparently clean, yielded three and one-half times, slightly soiled udders, eighteen times, and grossly dirty udders, ninety times, as much dirt. B. R. RICKARDS.

LABORATORY WORK.

Laboratory men are invited to send brief notes of laboratory news, authors' abstracts, new apparatus, new technic, summaries of results, etc., to the Managing Editor for this column. Line drawings, capable of reduction to 3″ x 4,″ will be inserted when necessary.

THE BACTERIOLOGICAL LABORATORY OF THE BOSTON BOARD OF HEALTH has been transferred from its old outgrown quarters in the Sudbury Building, occupied since 1898, to the Boylston Chambers, 739 Boylston Street, Room 501, telephone 1500 Back Bay, where greater space and conveniences have been secured.

In addition to the diagnostic work, which has increased very much since the laboratory was established, the bacteriological examination of the Boston milk supply has been recently undertaken, involving the examination of about six hundred samples each month.

THE BACTERICIDAL ACTION OF TYPHOID SERUM.—Stein and Kirk* add to fresh, untreated rabbit serum a dilution of a twenty-four-hour broth culture of typhoid bacilli, and varying amounts of treated typhoid serum, at 36.5° C. After three hours, plate. Normal human serum could not be diluted more than 1 to 200 to secure bacteriolysis by this method, while typhoid sera produced bacteriolysis in much higher dilutions,—even in 1 to 50,000 in some cases. No connection between agglutination and bacteriolysis was detected, the later developing the earlier in the course of an attack, and promising a valuable means of early diagnosis of typhoid, especially when the Widal reaction cannot be obtained.

Berl. klin. Wochen, 1904, No. 9, p. 213.

AUTOMATIC DISINFECTION OF CLINICAL THERMOMETERS.—Denny* reports experiments to show that 2 or 3 drops of ordinary commercial formalin, 40 per cent, dropped upon cotton packed into the bottom of the thermometer case, will sterilize the thermometer completely in five to twenty minutes, so long as a strong odor of formalin can be detected at the mouth of the case. Denny points out that this method should not be used when the thermometer is passed rapidly from mouth to mouth, since sufficient time for disinfection by this method will not then be had. The thermometer should be rinsed to remove the formalin taste before placing it in the patient's mouth. Denny attributes the excellent germicidal effect obtained in the short time mentioned upon *Staph. pyogenes aureus*, *B. typhosus*, *B. subtilis* (spores) and *B. diphtheriæ* to the high humidity reached and to the relatively high temperature obtained when the case is carried, as is usual, in the vest pocket.

TO AVOID "SPREADERS" ON AGAR PLATES.—At 37° C,. agar plates, especially if the atmosphere of the incubator be saturated, as it should be, with moisture, are prone to "spread," involving great annoyance in plating for isolation, and a considerable loss of "counts" in routine counting work on milk, sewage, water, etc.

To avoid spreaders, several plans are followed. One consists in the inversion of the Petri dish after the agar has hardened, but this is far from uniformly successful. Other methods involve the use of 20–22° C., instead of 37° C., for agar, or even reject agar entirely, substituting for it gelatine at 22° C.

In plating for isolation, it is often necessary, or at least preferable, to use the higher temperature, while the liquefaction common in gelatine plates from mixed cultures introduces for them a disadvantage almost as undesirable as the spreading of agar. In plating for counts, the higher temperature offers the further great advantage of uniformity, since constancy of temperature is readily secured at this point, while constancy at 20–22° C. is almost not to be had in most laboratories; and time-saving, since 24 hour counts at 37°C. are practically final counts.

* *Boston Med. and Surg. Jour.*, June 2, 1904.

In order to secure the advantages of agar plates at 37° C. for milk counts, while avoiding the objection due to spreading, Hill (Boston Board of Health Bacteriological Laboratory) suggested the use of a porous cover for the Petri dish, instead of the glass cover now almost universally employed. For this purpose, he found the earthenware "fern saucer" of the pottery trade very satisfactory, one of the regular sizes on the market happening to fit the standard Petri-dish capsule almost as if made for it. Dr. F. H. Slack, of the same laboratory, made careful comparative tests with the usual Petri dish and this modified form, in the routine milk counting of the laboratory, with the following results:

Atmosphere of incubator dry.

No. of plates with glass covers.	Spread.	No. of plates with porous cover.	Spread.
45	15%	46	2+%

Atmosphere of incubator moist to saturation.

86	36%	46	11%

The spreading under the glass covers was generally extensive and harmful, while in one-half of the porous-covered plates recorded as spread, the spreading was slight and negligible. Since the success or failure of the porous cover as a preventive of spreading depends on its absorptive powers, thorough drying of the earthenware after washing is essential, and is easily achieved by merely prolonging somewhat the dry sterilization employed for Petri dishes of the original type.

With this form of Petri dish it is not necessary to invert the dish after cooling the agar.

The "fern-saucer" is good, but it is probable that an earthenware or porcelain cover, made for the purpose, would prove even more satisfactory. Buttons placed at regular intervals on bottom of the dish inside, after Whipple's design for glass covers, would secre ventilation of the dish, as recommended by him.

WHY DIRTY MILK IS DANGEROUS.*

WHY IS DIRTY MILK DANGEROUS? Everyone knows how milk looks and how it tastes, and that it comes from cows, sheep, goats and other domesticated animals, and yet very few really know what milk is, or how it is made by animals, or how dangerous it can be when it gets dirty.

WHAT IS COWS' MILK? Cows' milk is a whitish, opaque liquid specially prepared in a milk organ (the "bag," or "udder") by living cells fed and nourished by the hot blood of the animal. As it comes from the cow, milk is warm, rich and sweet. It is *warm*, because it comes from the body of a warm-blooded animal. It is *rich*, because it contains a kind of invisible liquid meat, besides fats which, when milk stands, rise as *cream*. It is *sweet*, because it contains considerable sugar (milk sugar). It is also salty.

FRESH, PURE MILK. Milk like that just described is fresh and pure. It is *fresh*, because it has just come from the cow. It is *pure*, because it is milk, the whole milk, and nothing but the milk. Milk which has been robbed of its fat, or *skimmed*, is not whole, but skimmed, milk. Milk which has been "watered" or "doctored" is *adulterated* milk.

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* The present is the second (No. 2) of **POPULAR ESSAYS ON HYGIENE AND SANITATION**,—a series of leaflets prepared by Workers in the Sanitary Research Laboratory and Sewage Experiment Station of the Mass. Institute of Technology by the request and at the expense of a friend of sanitary education, and designed to teach in simple language some of the more important lessons of the time concerning Health and Disease, and especially the Prevention of Disease.

Some of the other leaflets of the present series, **SERIES A. ON DIRT AND DISEASE**, are:

No. 1. WHY DIRT IS DANGEROUS. (Ready.)
No. 3. WHY DIRTY WATER IS DANGEROUS. (Ready in November.)
No. 4. WHY DIRTY STREET SARE DANGEROUS. (In Preparation.)
No. 5. WHY DIRTY PERSONS ARE DANGEROUS. (In Preparation.)

Other leaflets may eventually be prepared upon "Microbes,—Good and Bad;" "Some Common Diseases: How they Come and how to Avoid them;" "Farm Sanitation;" "Why Flies are Filthy and Dangerous;" or other practical sanitary and hygienic topics.

It is hoped that Boards of Health, School Boards, Hospital Authorities, Charity Workers, Health-Education Leagues, Anti-Tuberculosis Societies and other Organizations, Philanthropic Persons and Educators may make use of these leaflets in that campaign of education in sanitation and hygiene in which all civilized peoples are now engaging.

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One to fifty copies . . . . . 2 cents each.
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IMPURE MILK. Milk may be made impure not only by skimming, watering or doctoring, but also by *dirt*, which gets into milk from dirty stables, dirty milkmen and dirty pails, cans, bottles, strainers, or other utensils and receptacles.

BABY MILK. The sucking calf gets from its mother pure, fresh and whole milk. The human baby thrives best also on its mother's milk; but when this fails, it may do very well on cows' milk, sometimes slightly altered to suit its needs. Above all, the bottle-fed baby needs *fresh*, *pure* and *clean* milk; and this, unfortunately, is often hard to get.

STALE MILK. Milk that is pure and fresh contains a few microbes, but only a few, and these chiefly harmless or even useful *souring microbes*, which slowly *curdle* the milk and are helpful in cheese making. As milk becomes *stale*, these microbes multiply enormously, and seriously alter the milk, so that the milk sugar disappears and an acid (*milk acid* or *lactic acid*) comes in its place. Every one knows that babies need sweet milk rather than sour milk, and it is easy to see why stale milk, which is much less sweet and pure than fresh milk, is not, therefore, good for babies.

DIRTY MILK. Like most white things, milk very easily gets soiled or dirty, but, unlike most white things, it does not easily *show* soil or dirt. If, instead of a pailful of milk (which is a thick and foamy white liquid), a pailful of downy or fluffy pure white cotton or wool were drawn from an animal in an ordinary cow stable, it would be easy to see how particles of dust and dirt getting into the pail from the air of the stable, or the hide of the cow, or the hands or clothes of the milker, would soon make the cotton or wool dirty, and also how hard it would be to get the dirt out, once it had got in. Now it is a fact, that milk which is fresh, looks pure, and would be pure if it were only clean, is often grossly impure simply because it is *dirty*.

WHAT IS DIRT? The word "dirt" comes from an older word, "drit," meaning *dung* or *excrement* and, strictly speaking, clean soil or clean earth should never be spoken of as dirt, for dirt means excrement, filth or dung, such as cow dung. Dirt (dung) is always rich in microbes, most of which cause milk to spoil quickly,

and some of which may be dangerous and even deadly. (For more facts about dirt, see Leaflet No. 1 of the present Series.)

HOW COW'S MILK GETS DIRTY. Milk as it comes from the cow is not only warm, rich, and sweet, but also perfectly *clean*. But with cow *stables* it is different. These are generally dirty, and too often the cows have no good care but must stand and lie in their own filth, which sticks to their hair, and later dries and drops off into the milk pail while the milker is milking. Too often also the dust from the hay, and dirt from the unwashed hands of the milker, fall into the pail; and too often the pails, strainers and milk cans are themselves dirty.

WHY DIRTY MILK IS DANGEROUS. Dirty milk is always dangerous, either for babies or for adults. It is dangerous for babies for two reasons: first, because dirty milk quickly gets stale and spoils, thus becoming unlike mothers' milk, which is always fresh, pure and clean. Cholera infantum, which kills many bottle-fed babies in very hot weather when milk spoils rapidly, is probably largely caused by stale baby milk. In the second place, dirt sometimes contains germs of dangerous and deadly fevers, such as typhoid fever, scarlet fever and diphtheria. Epidemics of these diseases even among children have been known to come from dirty milk.

Dirty milk is dangerous for adults as well as for children, chiefly for the second reason just given, namely, that it is liable to contain the germs of typhoid fever, diphtheria and other infectious or contagious diseases.

HOW MILK CAN BE MADE SAFE. Any milk not actually sour and spoilt can be made safe for drinking by heating it to the boiling point, cooling it, and using immediately. For babies, however, pasteurized milk is generally better than boiled milk. To pasteurize milk for babies, the milk should first be got *as pure, fresh and sweet as possible;* it should then be put into bottles or tins which have been thoroughly scalded and scoured. These bottles or tins should then be loosely stoppered or covered, and set into a vessel of water, which should be heated nearly, but not quite, to the boiling point, and kept there for half an hour. If a thermometer can be had, the milk (not the water outside of it)

should be kept at 160° for at least twenty minutes. The milk should then be cooled and kept, on ice if possible, until it is used, but it should never be used in hot weather for babies after it has stood more than a few hours. The feeding bottle, nipple and tube are very apt to get dirty or sour, and should be scalded frequently.

HOW CAN WE GET BETTER MILK? Cleaner, fresher, and therefore, sweeter and safer, milk is greatly needed in all our cities and towns, and this can only be secured by greater cleanliness on the part of farmers and milkmen.

Buyers should refuse to take milk that is stale, dirty, sourish, or "cowy" in odor; but, on the other hand, consumers, especially those having babies to bring up, should be willing to pay somewhat more for clean, sweet and pure milk, because it costs the farmer more to produce and deliver such milk, and he is not likely to take the pains to do this unless his customers ask for it and are willing to pay more for clean milk. It is unreasonable and absurd to spend money on luxuries and yet refuse to pay a little more for milk that is pure, fresh, and free from cow dung.

All milkers should wash their hands before sitting down to milk. The cows should be given plenty of fresh air and exercise and groomed or otherwise cared for, as horses are. It is absurd to treat horses, which we use chiefly for work or for pleasure, better than we do cows that give us food to drink. All pails, cans, bottles, strainers and other utensils should be *thoroughly* cleaned by *scalding* water before they are used for holding milk.

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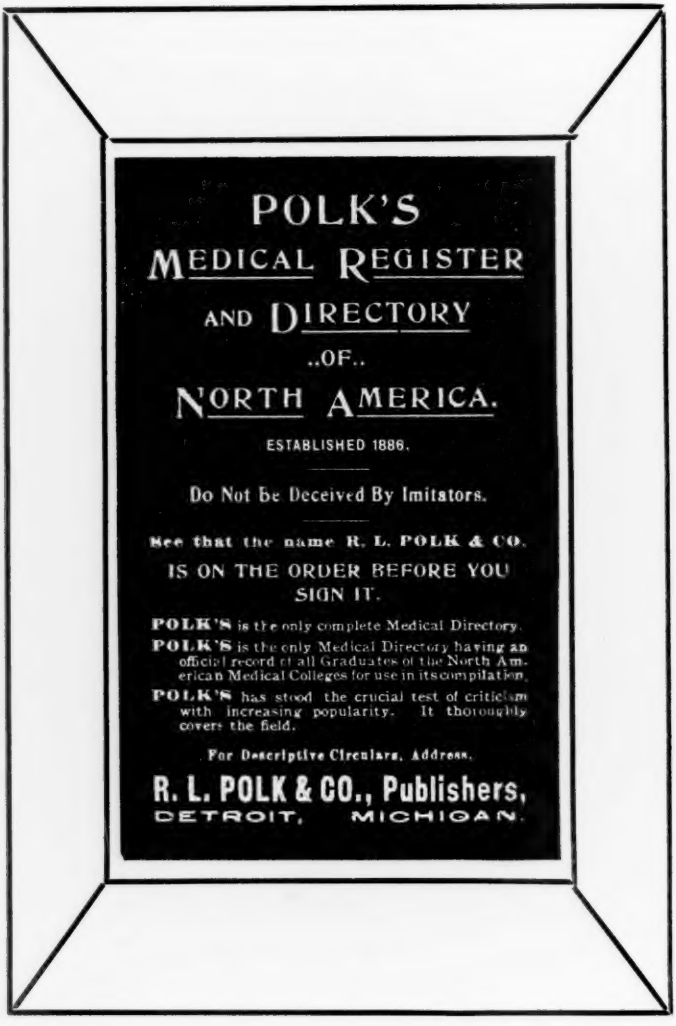
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